

Platinum Nanoparticles Induced Modifications to the Inflammatory and Signaling Responses in Liver Cancer Cells

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Rationale

- Due to their unique properties, platinum nanoparticles (PtNPs) hold potential for biomedical therapeutics.
- Potential applications include cancer ablation, drug delivery, and bio-imaging.
- Prior to their utilization as therapeutics we need to better understand the cellular response to PtNPs.
- The goal of this study was to elucidate the response of human liver cells to acute PtNP exposure, as a function of concentration.

Methodology

- Human liver, HepG2 cell model: Liver cancer line
- 70 nm, citrate coated PtNPs: Purchased from nanoComposix
- Safety evaluation: Introduce PtNPs into the HepG2s at multiple dosages, incubate for 24 hours, then assess the biological response

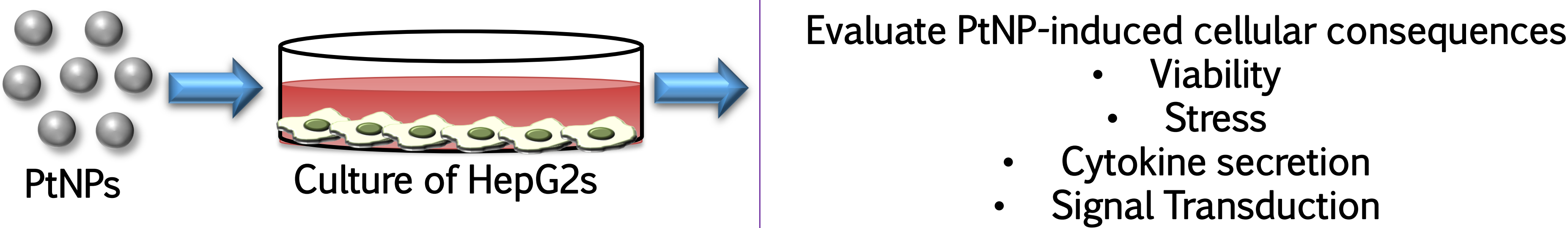


Figure 1: Experimental Approach

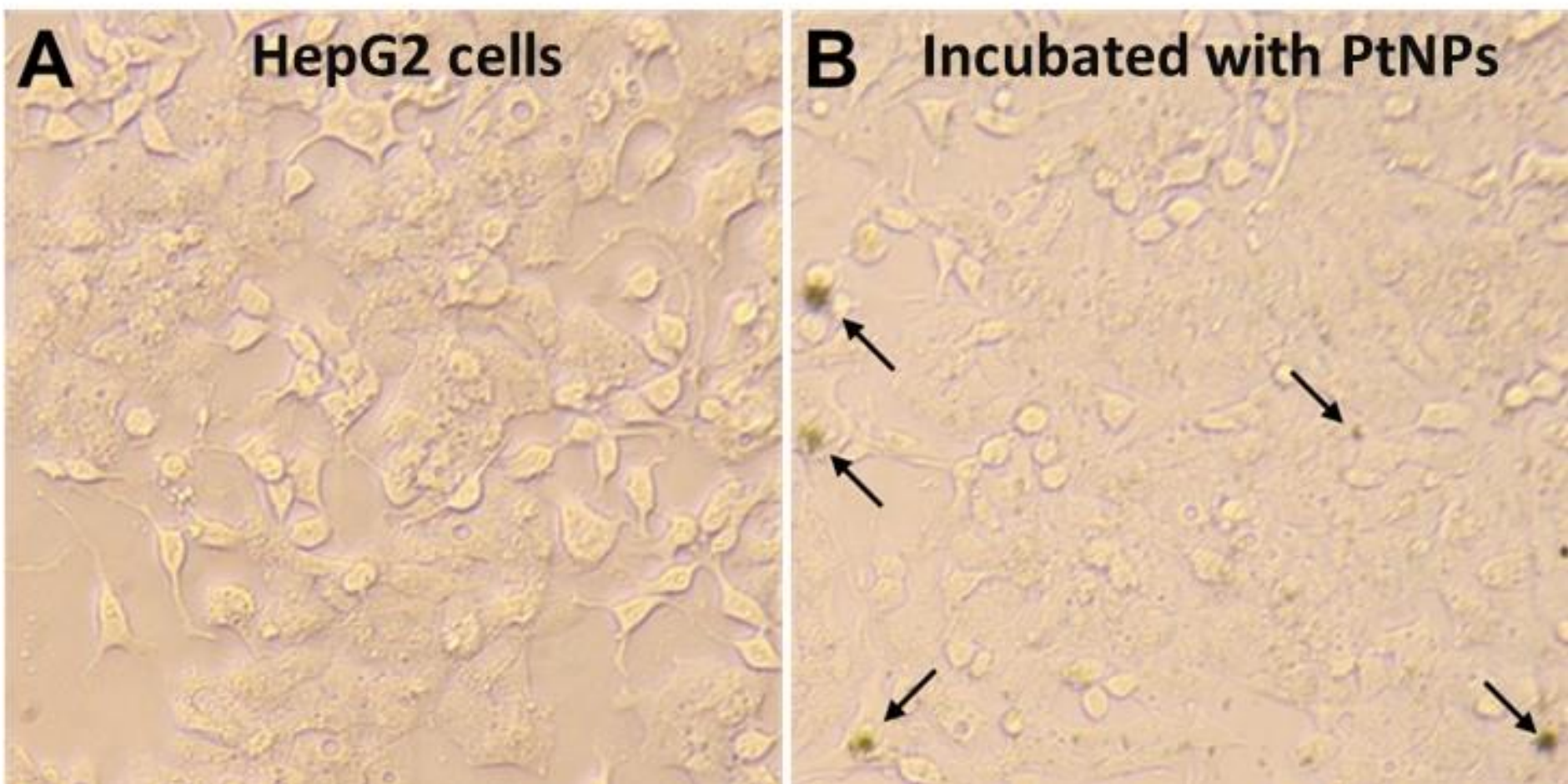


Figure 2: Images of the HepG2 cells (A) alone and (B) with PtNPs. The arrows indicate PtNP-HepG2 association.

Results

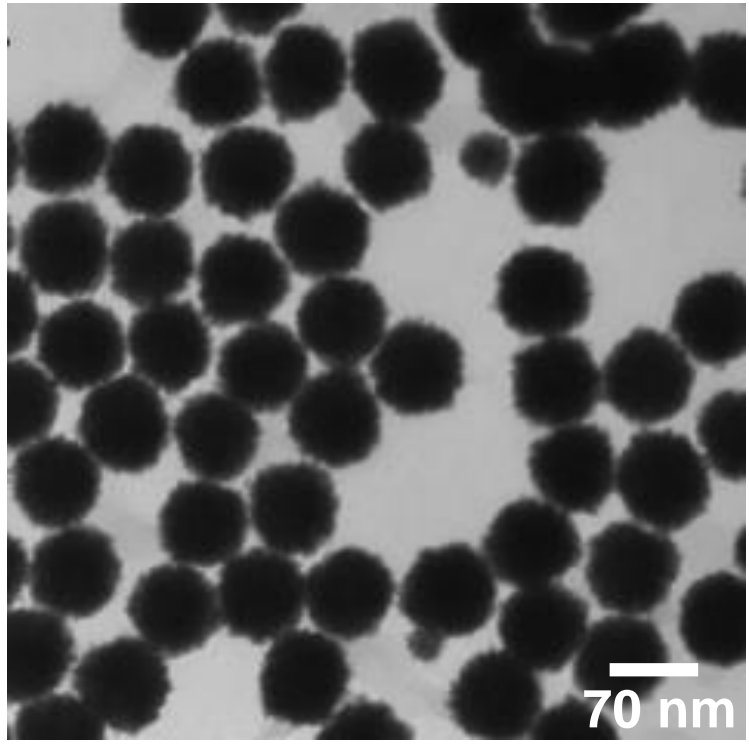


Figure 3: TEM of the 70 nm PtNPs

Table 1: PtNP Characterization Details

Primary Size (nm)	Agglomerate Size (nm)		Zeta Potential (mV)	
	Water	Media	Water	Media
68.3 ± 3.5	85.9 ± 3.5	112.4 ± 7.0	-40.6 ± 1.1	-12.2 ± 0.9

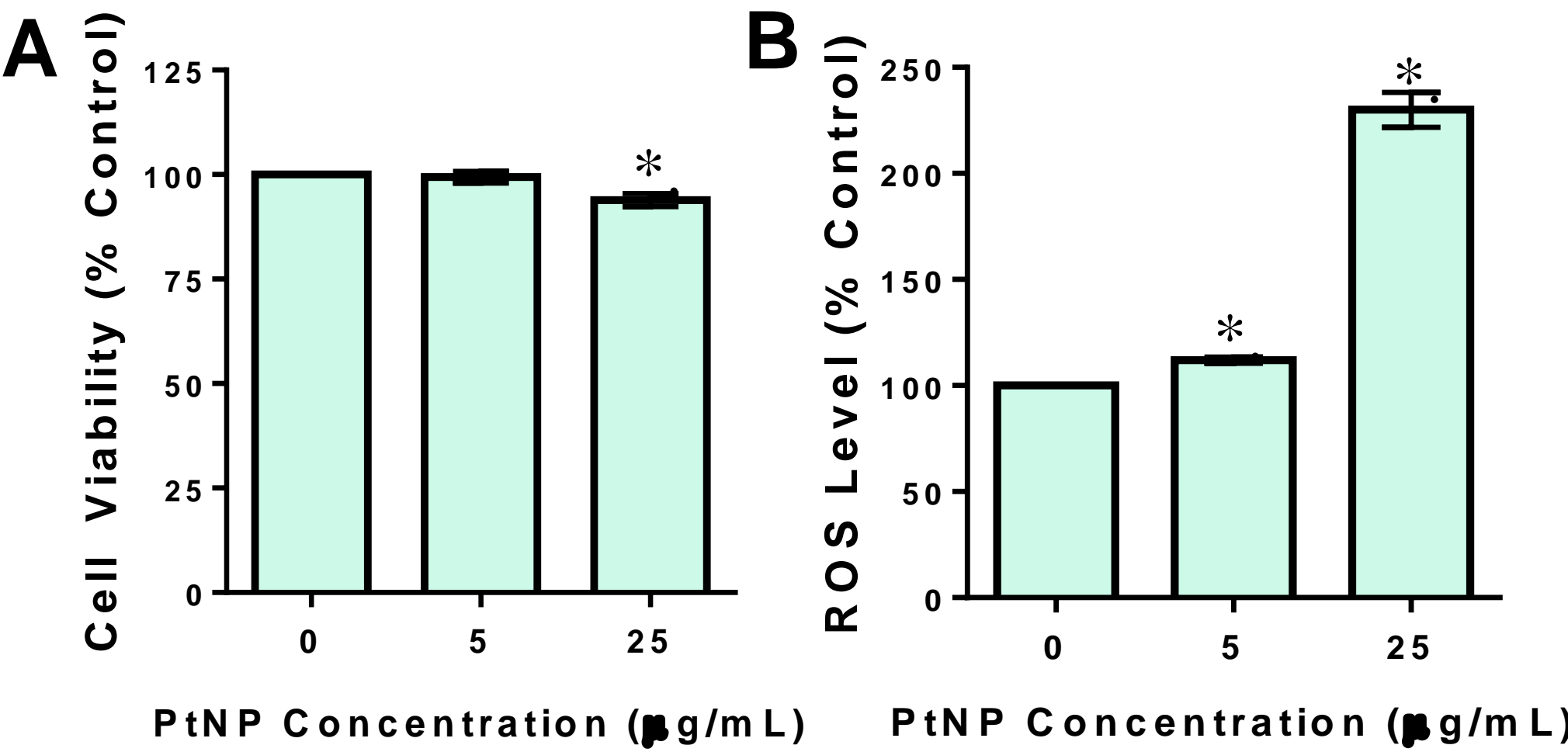


Figure 4: HepG2 (A) viability and (B) stress following PtNP exposure

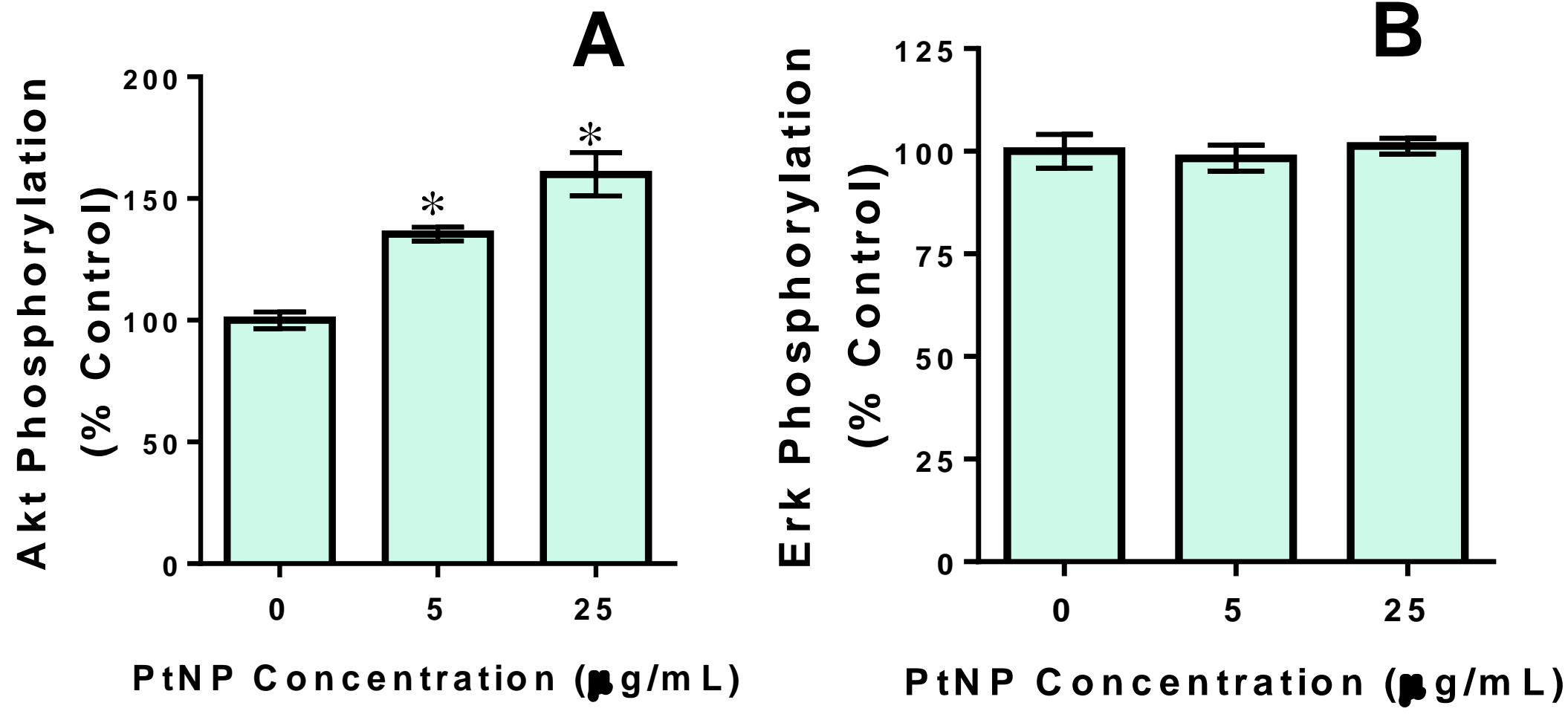


Figure 5: IGF-1 induced (A) Akt and (B) Erk activation.

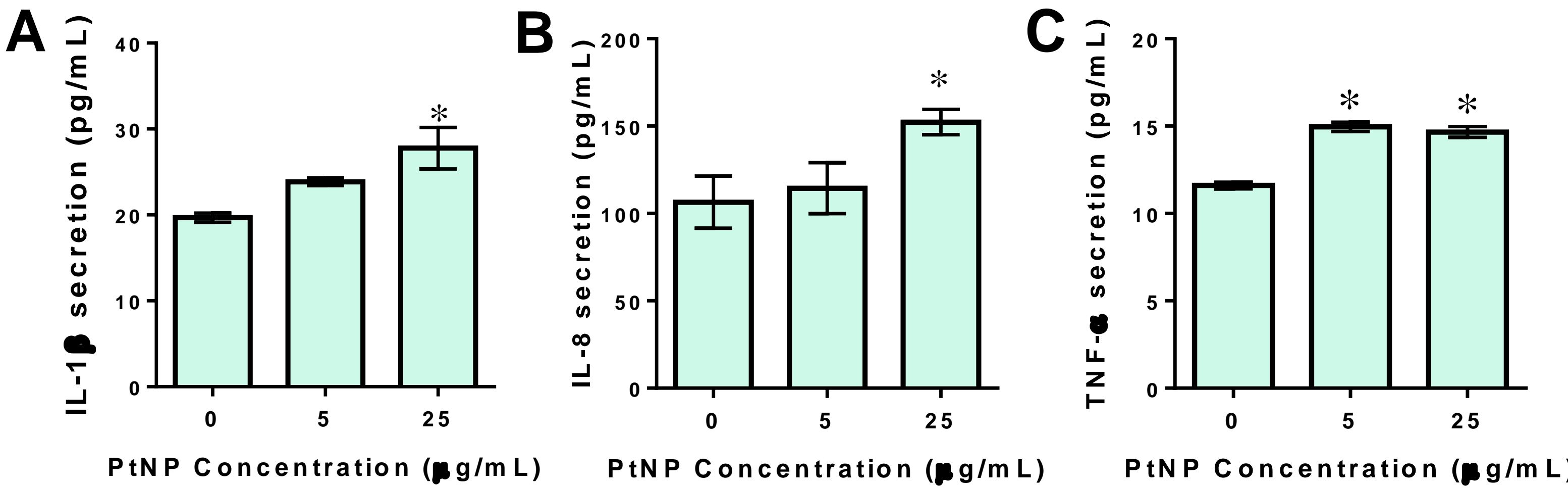


Figure 6: Secretion levels of (A) IL-1β, IL-8, and TNF-α following PtNP exposure.

* Indicates statistical significance from untreated control, n=3, p<0.05

PtNPs activated stress, inflammatory, and signaling responses.

Characterization

HepG2 Response

Conclusions

- At higher dosages PtNPs were able to induce stress and inflammatory activation in human liver cells.
- Incubation with PtNPs increased activation of Akt.
- Taken together, these results indicate that chronic exposure could induce health consequences.